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| OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic |
| Meeting of the Environmental Impact of Human Activities Committee (EIHA) Madrid (Spain) and on-line: 15-19 April 2024 |

Terms of reference for Expert Group on Alteration of Hydrographical Conditions (2024-2026)

## Background

1. The intensification of human activities offshore results in an increasing risk of permanent alteration of hydrographical conditions that adversely affect marine ecosystems. Permanent alteration of hydrographical conditions can result in changes in the thermal or salinity regimes, changes in the tidal regime, sediment, and freshwater transport, current or wave action and changes in turbidity. The degree of change and the period over which such change occurs varies considerably, depending on the type of activity and its location. Climate change will also have an impact on underlying hydrographical conditions. Because of (i) future developments of offshore activities, such as renewables, outside of the coastal waters., , (ii) the decommissioning of old oil and gas infrastructure there is clearly a need for a wide ranging expert network that focusses on offshore. The most recent documents related to hydrographical conditions by OSPAR (2012), Gonzales et al. (2014) and Spiteri (2015) are out of date.. An update on the assessment of the hydrographical conditions is necessary, (Friedland, Boschetti, & Stips, 2021) because there is a lack of homogeneous methodology . It is expected that EU member states find a consistent methodology (method, spatial coverage and assessment period), a common terminology, a harmonized way to include WFD assessment for coastal waters and a reflection on climate change for the alteration of hydrographical conditions.

### Future developments

2. The need to have clear guidance and regional coordination on hydrographical conditions is exacerbated by the increasing number of offshore activities. Several maritime activities such as, fishing and aquaculture, shipping, coastal tourism developments, renewable energy (e.g., wind and solar), undersea cabling, seabed extractive industries and deep-sea mining, and associated infrastructure can result in alteration of hydrographical conditions. These alterations can be transient or can result in longer term changes to current patterns and hence sediment transport, as well as other impacts such as changes in water column mixing (stratification) that can impact primary production. Increased intensity and scope of certain activities such as Offshore Renewable Energy (ORE), means that alteration of hydrographical conditions may become more widespread across the OSPAR region. For Offshore Wind Farms (OWF), which started at the end of the 20th century, the target capacity will increase from 22 GW (2021) to 300 GW (by 2050) as outlined in the EU strategy on offshore renewable energy (COM(2020)741). Almost half of this (120 GW in 2030) will be within the North Sea, stated in the Ostend Declaration. In addition, the UK has ambitions to deploy up to 50GW of offshore wind capacity by 2030.

### Ecological impacts

3. The extent of the impacts of these activities on permanent alteration of hydrographical conditions remains largely unknown. Some activities will result in the permanent but mainly local alteration of the seabed (such as concrete structures associated with turbine foundations or port extensions), while others will result in altered hydrographical conditions which may result in the system finding a new equilibrium. However, recent observations (Baeye & Fettweis, 2015) suggest that turbulence and current wakes developing behind each offshore wind turbine pile alter hydrodynamics over an area that will be wider than a single wind farm. These changes can impact the conditions for stratification and sediment transport (Van Duren, et al., 2021). Similarly, the latest model study from the North Sea (Daewel, Akhtar, Christiansen, & Schrum, 2022) suggests changes that lead to a potential decrease in primary production. Due to these increased human activities offshore, it is necessary to increase our knowledge of where the activities take place and what resulting alterations of the hydrographical conditions occur, including their resulting cumulative impacts. Another aspect would be the ecological impacts of climate change on hydrographical conditions and their effects on impacts related to anthropogenic activities.

## Objective of the expert group

4. The expert group will have two objectives:

1. To produce a guidance document for the development of a regional assessment on hydrographical conditions with a focus on offshore wind farms;
2. To deliver a regional assessment to support the implementation of the North-East Atlantic Environment Strategy 2030 and the EU Marine Strategy Framework Directive, in close cooperation with ICG-ORED.

## Scope of work

5. The Expert Group Alteration of Hydrographical Conditions will frame its work in the context of the EU MSFD and the OSPAR QSR. The focus is to *develop a common understanding of the use of the adverse effects of alteration in hydrographical conditions* *criteria in status assessment and associated guidance for an assessment framework and close identified guidance gaps: A coherent to the OSPAR QSR and the MSFD assessment requires more specific guidance on all aspects set out in MSFD assessment to develop a common understanding and use of these criteria in status assessments* (Acangeli, et al., 2022), as well as their relationships with others European Directives. Clarification on the role of the criteria is needed to follow up on potentially increasing offshore pressures e.g., from other EU and national policies including alternative energy generation (expansion of offshore wind farms) and blue economy objectives. It is timely to start working on an assessment framework to accompany major infrastructure developments and mitigate their cumulative impacts on hydrographical conditions in the period up to 2030. The work will also anticipate the issue of climate change’s potential impacts on hydrographic conditions.

6. Cumulative impacts of development on a regional seas scale will be an important focus point (related to all mentioned scoped activities). Therefore, Expert Group Alteration of Hydrographical Conditions will collaborate with ICG-Eco-C which carries out broad cumulative impacts work.

Priorities

7. While the scope of Expert Group Alteration of Hydrographical Conditions is broad, it is necessary to concentrate efforts related to the expansion of offshore renewables and the cumulative impacts and its extension at regional seas scales.

## Activities and deliverables

8. Within the identified scope the expert group will be divided over two interlinked tracks:

Develop guidance

The guidance focusses on an extensive update/improvement on the OSPAR guidance document of 2012 by answering the following questions:

* Based on the human activities identified for MSFD (Acangeli, et al., 2022) can we clearly define ‘physical loss of the natural seabed’ that causes a (permanent) alteration in hydrographical conditions; specifically in consideration of the definition which has been agreed through the development of other indicator thresholds and on what scale?
* When are alterations in hydrographical conditions considered significant enough to be reported?
	+ What is the best practice statistical analysis available to identify a significant departure in hydrographical conditions from the reference state?
	+ In addition, what change in hydrographical results in an impact (e.g., identify pressure-response curves)?
	+ What sampling regime would be required to ensure sufficient data to undertake this analysis? Also, considering the use of specific models?
* How do alterations in hydrographical conditions relate to the seabed, and how do they affect the water column processes, mixing and sediment transport? And which effects in the water column should be linked to pelagic habitats?
* Besides the effect on the seabed how do changes in hydrographical conditions effect other aspects of the marine environment (like biodiversity, food webs and eutrophication) and does a general analysis of the alteration in hydrographical conditions be included as boundary to other descriptors?
* What is currently the best practice in assessing the impacts of physical loss of natural seabed on hydrographical conditions and how can Contracting Parties benefit from the latest studies? And how can project specific results be applied to a broader assessment?
* What is the hydrographical extent (footprint) per activity that should be accounted for? And specifically, what are the cumulative impacts of all human activities?
* How do different hydrographic conditions cumulatively affect benthic habitats?
* In consideration of the MSFD Article 8 Guidance what spatial scales are appropriate for the assessment of D7? How can an expert group on hydrographical conditions provide a useful input for assessments of the Member States?

Develop a regional approach/ assessment

The assessment should be based on a general framework that must be developed. This framework can include principles for marine spatial planning, approaches on impact assessment, evaluation principles, principles for dealing with uncertainties and data and knowledge gaps and principles on mitigation and compensation.

## Initial tasks for 2024/2026

* Expert Group Alteration of Hydrographical Conditions will develop draft common principles for a regional sea approach focus on hydrographical conditions.
* Expert Group Alteration of Hydrographical Conditions will contribute to NEAES Task SX.O1.T1 (Supporting OSPAR’s Contracting Parties that are EU Member States in implementing the Commission Decision (EU) 2017/848 on GES) and if appropriate draw up one or more tasks for inclusion within the NEAES 2030 Implementation Plan.
* Expert Group Alteration of Hydrographical Conditions will develop and apply a time-bound working plan elaborating on the mentioned activities, milestones and planning.

## Working procedures

8. The Expert Group will liaise with other expert groups of OSPAR, such as within EIHA (Environmental Impacts of Human Activities), ICG-ORED (Offshore Renewable Energy Development), ICG-Eco-C (Cumulative effects), WG-COCOA (Ocean Acidification and Climate) or BDC (Biological Diversity & Ecosystems), and where appropriate collaborate to ensure efficiencies and the sharing of expertise and resources. ICG-ORED focusses on all offshore renewable energy developments and their potential pressure on the marine environment. The scope of ICG-ORED is broad, but currently priority is given to marine birds, because of the poor status in parts of the OSPAR maritime area. Therefore, the work ICG-ORED is not directly focusing on hydrographical conditions, which should also have more focus on coordination with other descriptors/ indicators (covering biodiversity, food webs and sea floor integrity). As mixing-characteristics could be changed, as indicated above, a link to eutrophication may need to be considered (OSPAR, 2012). Cumulative impacts of developments on a regional seas scale will be as important as well as the local effects, which might require connection with ICG-Eco-C that carries out broad cumulative impacts work.

9. The Expert Group should look to maximise the impact of its work and avoid duplication of effort by regularly communicating and engaging with ICES, The Great North Sea Basin Initiative (GNSBI) and other regional seas programs on any related work they are doing.

10. The Expert Group will meet two times a year; in May with (if possible) a meeting in person (hybrid possible) and in October in a virtual meeting. In between, subgroups can meet in a way and frequency as they deem necessary virtually.

11. The Expert Group will report on an annual basis to EIHA on progress made, implementation of NEAES tasks and discuss revision of the ToR as necessary.

12. Continuation of the Expert Group and its mandate will be decided upon by EIHA on a three-year basis.

## Co-convener and Participants

13. The expert group will be convened by the Netherlands (Wout van Dijk), Belgium (Sébastien Legrand) and is open to all OSPAR Contracting Parties and Observers.

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